

CLAIMS

1. A plasma generating electrode comprising at least a pair of unit electrodes disposed at a predetermined interval and capable of generating plasma upon application
5 of voltage between the unit electrodes,

each of the pair of unit electrodes including a plate-like ceramic body as a dielectric and a conductive film disposed inside the ceramic body and including a plurality of protrusions having a predetermined thickness and arranged in a predetermined pattern on one surface,

10 the pair of unit electrodes (upper unit electrode and lower unit electrode) constituting one basic unit by being hierarchically layered at intervals corresponding to thickness of the protrusion in a state that a plurality of spaces which are open on each end in an arrangement direction of the protrusion are formed by a front surface of one unit electrode (lower unit electrode) of the pair of unit electrodes, surfaces of the
15 protrusions disposed on the front surface, and a back surface of the other unit electrode (upper unit electrode),

the basic units being hierarchically layered at intervals corresponding to the thickness of the protrusion and constituting an electrode unit in which the unit electrodes and the spaces are three-dimensionally arranged,

20 the plasma generating electrode being capable of generating plasma in the three-dimensionally arranged spaces upon application of voltage between the unit electrodes constituting the electrode unit.

2. The plasma generating electrode according to claim 1, wherein, in a state that,
25 on a front surface side of a basic unit electrode having a shape in which a margin is added to an external shape of the unit electrode, a plate-like protrusion formation frame having almost the same external shape as an external shape of the basic unit electrode,

having the same thickness as the thickness of the protrusion, and having a plurality of through-holes whose one side parallel to the arrangement direction of the protrusion is equal to or longer than a length of the protrusion and whose one side perpendicular to the arrangement direction of the protrusion is the same as the arrangement interval between the protrusions is disposed, the unit electrodes and the spaces which are open on each end in the arrangement direction of the protrusion are formed by cutting the basic unit electrode and the protrusion formation frame at positions corresponding to the ends of the spaces along a plane almost perpendicular to the front surface of the basic unit electrode.

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3. The plasma generating electrode according to claim 1 or 2, wherein the basic unit includes a first conduction through-hole and a second conduction through-hole which are formed through the basic unit in a vertical direction from regions on its top surface other than an arrangement region of the protrusions in a state that the first conduction through-hole and the second conduction through-hole are in contact with at least a part of one of the conductive films disposed in the upper unit electrode and the lower unit electrode, and

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electrical conduction can occur from the top surface to a bottom surface of the basic unit through the first conduction through-hole, the second conduction through-hole, and the conductive film.

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4. The plasma generating electrode according to claim 3, wherein the basic unit includes conductive films (first through-hole conductive film and second through-hole conductive film) disposed on inner walls of the first conduction through-hole and the second conduction through-hole, and electrical conduction can occur from the top surface to the bottom surface of the basic unit by allowing the first through-hole conductive film and the second through-hole conductive film to be in contact with the

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conductive films disposed in the upper unit electrode and the lower unit electrode.

5 5. The plasma generating electrode according to claim 1 or 2, wherein the
conductive films disposed in the upper unit electrode and the lower unit electrode
constituting the basic unit extend to both ends of the basic unit in a direction
perpendicular to the arrangement direction of the protrusion,

the basic unit includes conductive films (first end face conductive film and
second end face conductive film) disposed on end faces on the both ends, and electrical
conduction can occur from the top surface to the bottom surface of the basic unit by
10 allowing the first end face conductive film and the second end face conductive film to
be in contact with the conductive films disposed in the upper unit electrode and the
lower unit electrode.

15 6. The plasma generating electrode according to any of claims 1 to 5, wherein an
opening percentage is 20% or more.

20 7. The plasma generating electrode according to any of claims 1 to 6, wherein
the thickness of the unit electrode is 0.1 to 5 times the interval corresponding to the
thickness of the protrusion.

8. The plasma generating electrode according to any of claims 1 to 7, wherein a
width of the protrusion is 0.1 to 5 times the interval corresponding to the thickness of
the protrusion.

25 9. The plasma generating electrode according to any of claims 1 to 8, wherein a
distance between adjacent protrusions is 0.2 to 20 times the interval corresponding to
the thickness of the protrusion.

10. A plasma reactor comprising the plasma generating electrode according to any of claims 1 to 9, wherein, when gas containing predetermined components is introduced into the spaces three-dimensionally arranged between the unit electrodes constituting the plasma generating electrode (electrode unit), the plasma reactor is capable of causing the predetermined components in the gas to be reacted by plasma generated in the spaces.